[redacted]

June 17, 1969

STAT Subject: Contract [redacted]

Gentlemen:

As discussed in recent meetings with your technical representative the cost status of the Image Comparison Microstereoscope has been reviewed in detail. Unfortunately costs appear to be running in excess of those originally estimated and a cost overrun appears evident.

Attached is a cost summary reflecting our accumulated expenditures, including overhead adjustments. The actual overhead rates for 1968 are still in the process of being reviewed by the [redacted] STAT however, the rates shown reflect our best estimate of the eventual rates.

The final negotiated rates for 1968 and the establishment of new provisional rates are expected to be complete within sixty days. This summary is submitted for your information only. We will make a formal submission for overrun on completion of the overhead negotiation.

Very truly yours,

[redacted] STAT

Program Administrator
Photogrammetric and Military Systems

STAT [redacted]

cc: Al N

Encs

Declass Review by NIMA/DOD

STAT

June 19, 1969

SUBJECT: Contract [redacted] STAT

STAT REFERENCE: [redacted] Letter June 17, 1969

Gentlemen:

Reference is made to the cost analysis on the Image Comparison Microstereoscope as discussed in my recent letter. Additional information has been compiled, and is herein submitted for your evaluation.

The attached data includes a Technical Analysis of Cost Variance, a comparison of original to new total funds requested, and a breakdown of the new total estimate listing labor hours and related rate categories.

A detailed schedule for the completion of this project is currently being prepared, however, at present we feel that the current schedule of January 30, 1970 can be maintained. The detailed schedule will be supplied with the next monthly progress report.

If you have any questions concerning this project, please contact the writer directly.

Very truly yours,

STAT [redacted]

Program Administrator
Photogrammetric & Military Systems

CJJ:cm

Next 1 Page(s) In Document Exempt

Approved For Release 2003/04/17 : CIA-RDP78B05171A000800060059-2

STAT

STAT

STAT

June 19, 1969

IMAGE COMPARISON MICROSTEREOSCOPE

Technical Analysis of Cost Variance

PROGRAM MANAGEMENT

More duplication of effort during optical concept phase.

Increased instrument complexity, particularly in optical design areas (objectives) and stage design required more project direction than anticipated. Additional consulting time on controls required.

OPTICAL DESIGN

Objectives optical design proved to be more difficult than originally anticipated. Original design did not provide sufficient margin for performance loss in the system. Design was recomputed to a higher numerical aperature to provide a 16% margin.

Experience with the similar objective lenses of the Advanced Stereo Rhomboid indicated the objective doublets should be matched for thickness in order to meet the desired optical performance, especially in the areas of spherical aberration and, to some extent, astigmatism.

Further optical analysis showed matching tables were also desired for matching air spaces in order to adjust for tolerance build up in areas of radii, element thickness and glass indices.

Reports submitted provide a more detailed explanation.

The original concept to use a doublet for the collimator and decollimator relays proved to be unsatisfactory and each was redesigned to a triplet. The location of the pupil plane (in the anamorphic system) also caused more problems than anticipated.

The 1X relay was also designed to be a doublet however, it too required redesign to a triplet form. This was not anticipated in the original estimate.

STAT

[redacted]

MECHANICAL DESIGN

The 4-bar linkage required extensive analysis to determine the optimum parameters (link spacing, size) for this application. Tracking errors due to backlash, bearing fit, and flexure were also analyzed to assure a successful design.

Optical packaging restrictions required that one zoom system be mechanically different from the other three. This redesign effort was not anticipated.

The eyepiece design, while basically a standard [redacted] Dynazoom, had to be modified to accept a larger free aperture due to the focal length of the 1X relay lens. STAT

The Optical Switch task, which includes mounting of the 1X relay, was overrun because of packaging difficulties resulting from the 1X relay being a triplet in lieu of a doublet.

The focusing mechanism was designed to provide the required focusing pitch and to fit within the tight confines of the optical arms. Originally, a standard Dynazoom focusing mechanism was to be simply modified to fulfill these requirements.

Reiteration of the optical system layout required repackaging of the optical subassemblies. This process was redone more than the estimated number of times because of the optical redesign. Any conjugate change necessitated a complete review of the mechanical system layout to assure compatibility with the remaining portions of the system.

Grouping of the channel indicator reticles in proximity to the anamorphic systems to provide a common rotation control required considerable system layout effort. For example, in one position the reticle rotational drive gear vignetted the optical path of the anamorphic system and the gear had to be relocated to a position which would still permit a direct coupling to the anamorphic subassembly without vignetting. Considerable design effort was necessary to accomplish this.

Flexure analysis indicated that a conventional base and supporting frame could not be used because the center loading of the upper structure deflected the base beyond acceptable limits. Considerable redesign was necessary to resolve this difficulty. The resulting design for the supporting legs is more complex than originally estimated.

STAT

The ideal positioning of the controls, as indicated by the human factors analysis, required the grouping of controls by stage, with a similar orientation of the controls for each stage. In order not to compromise on control location, which is extremely important in a instrument of this complexity, the net result is a very complex drive linkage system involving multiple belts, co-axial shafts, non standard toothed belts, and idler assemblies. The additional drive mechanism further complicates the effort required to keep the lines of sight of the optical path clear.

The stage analysis resulted in a different stage configuration than originally planned and the resulting geometry increased the difficulty in mounting the stage within the space available. The common drive stage lock also proved to be considerably more complex to analyze and design than originally anticipated.

In general, we are well satisfied with the outcome of the 4-bar linkage analysis and the resulting design and expect the stage to function as planned. The extra effort in the design of the stage has afforded some cost savings in the manufacture of this assembly.

The packaging problem again proved to be more difficult than planned as, the addition of the split field stereo masks necessitated a different approach to the method of mask insertion. The masks are now inserted from the center outward rather than vertically because of space limitations.

The detailing tasks are overrun for two major reasons. The increased complexity of the mechanical designs has necessitated increased detailing cost. We also feel the original detailing tasks were grossly underestimated in most areas.

More complex optical designs have also required additional drafting time.

The more sensitive optical designs of the objectives, anamorphic collimators and decollimators and 1X relays have increased the overall sensitivity of the optical system with the result that the alignment is more critical. In addition, recent experience with the Advanced Stereo Rhomboid indicates that these objectives require much more alignment and optimization to meet the expected performance. This additional work was not anticipated prior to the ASR experience.

Alignment of the mechanical system and tool design are tasks which have been added because we feel that increased system complexity warrents

STAT

the specific review of the mechanical alignment by the mechanical design team. These tasks were not anticipated in the original estimate.

System testing has been increased in order to better evaluate the overall performance of the instrument. The increased complexity of the instrument and the addition of more functions will require additional time.